

REMARKS

Claims 1-8 are pending in the application. Claims 5-8 have been withdrawn as being drawn to a non-elected invention. Claim 1 has been amended by the present amendment. The amendments are fully supported by the specification as originally filed.

As an initial matter, Applicants have re-submitted the drawing correction filed with the Letter to Official Draftsman on May 26, 2003. Attached hereto is a Replacement Sheet of FIG. 2 in which reference numeral 18 has been added, representing a gap between the die pad 11 and the plurality of leads 12 (see specification at page 5, last paragraph). Approval of the drawing correction is respectfully requested.

Applicants' claimed invention is directed to a semiconductor package for preventing resin flashes. A lead frame is used as a chip carrier, the lead frame having a die pad and a plurality of leads surrounding the die pad. Each lead is defined into an inner lead, a middle portion, and an outer lead. A resin compound forms an encapsulant for encapsulating the lead frame (except the outer leads), the encapsulant having a cavity by which the die pad and inner leads are exposed, such that a semiconductor chip can be received within the cavity and mounted on the die pad, while being electrically connected to the inner leads by bonding wires.

As recited in claim 1, the middle portion of each lead extends outwardly at sides thereof to form protrusions, so as to reduce spacing between the adjacent middle portions of the leads (see reduced spacing formed by the protrusions 1220 of adjacent middle portions 122 in FIG. 2). During fabrication of the encapsulant, when the resin compound flows to the middle portions of the leads, the reduced spacing of the leads causes the resin compound to slow down, which reduces the area available for resin flow, thereby preventing flash of the resin compound on the exposed die pad and the inner leads (see specification at page 7, first full paragraph). The flash-preventing mechanism taught by Applicants is achieved through a simple modification of the lead structure, thereby reducing manufacturing costs.

Claims 1 and 2 were rejected under 35 USC 103(a) as being unpatentable over U.S. Patent 5,523,608 to Kitaoka et al. (hereinafter "Kitaoka") in view of U.S. Patent 6,315,465 to Mizue et al. (hereinafter "Mizue"). Claims 3 and 4 were rejected under 35 USC 103(a) as being unpatentable over Kitaoka in view of Mizue, and further in view of U.S. Patent 5,479,051 to Waki et al. These rejections are respectfully traversed, and for convenience are addressed together.

Neither Kitaoka nor Mizue, whether taken alone or in combination, teach or suggest the semiconductor package of the Applicants' claimed invention having a flash-preventing mechanism as recited in claim 1.

Kitaoka discloses a multi-chip semiconductor package incorporating a solid state image sensor and a peripheral IC, for reducing packaging area (see column 2, lines 14-17). As shown in FIG. 1, the peripheral IC 6 is mounted on a lower surface of an island 7 of the lead frame L and sealed by a molded resin block 8 (see column 3, lines 45-55). The solid state image sensor 1 is mounted on an upper surface of the island 7 and received within a cavity formed by the molded resin block 8, which is sealed by a transparent lid 11. Therefore, according to the invention of Kitaoka, both a solid state image sensor and a peripheral IC are incorporated into a single package, thereby reducing packaging area, and allowing "video equipment such as video cameras to be miniaturized" (see column 5, lines 1-7).

Kitaoka does not teach or suggest a flash-preventing mechanism as recited in claim 1 of the Applicants' invention. Kitaoka does not teach or suggest middle portions of leads which extend outwardly to form protrusions for reducing spacing between adjacent middle portions of the leads. As stated in the Office Action: "Kitaoka et al. fail to disclose each of the middle portions extends outwardly at sides thereof to form protrusions" (Final Office Action, page 3).

Mizue fails to remedy the deficiencies of the Kitaoka reference. Specifically, Mizue fails to teach or suggest a plurality of leads having middle portions which extend outwardly to form protrusions for reducing spacing between adjacent middle portions, and thereby preventing flash of a resin compound on an exposed die pad and inner leads.

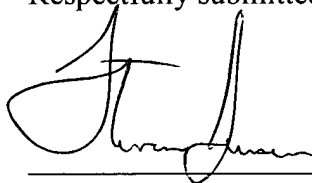
Mizue discloses an optical module of dual inline package (DIP) type, for electrically connecting a wiring substrate and a lead frame without wire bonding. As shown in FIGS. 2-4 of Mizue, a lead frame 2 has a plurality of inner lead pins 8 and outer lead pins 10 provided with connecting portions 8a and 10a for connecting a wiring substrate 20 (see column 5, lines 24-25). Electrodes 20a of the wiring substrate 20 are attached to the connecting portions 8a and 10a to thereby electrically connect the wiring substrate 20 to the lead frame 2 without the use of bonding wires (see column 6, lines 41-52). An electronic circuit encapsulating portion 18, formed by an encapsulating resin, is used to encapsulate the wiring substrate 20 and connecting portions 8a and 10a, allowing the outer lead pins 10 to be exposed and project from the encapsulating portion 18 (see column 4, lines 47-49), and thereby "bend ... into a hook shape" to form the configuration illustrated in FIG. 1 (see column 6, lines 18-23). In Mizue, the thickness of the encapsulating resin formed on an upper side and a lower side of the lead frame is controlled to prevent distortions and cracks (see column 3, lines 17-33).

In Mizue, the outer lead pins 10 remain outside of the encapsulating portion 18, and thus are not equivalent to the "middle portions of the leads" as recited in claim 1, where the middle portions of the leads must be encapsulated by a resin compound. In the Applicants' invention, the resin compound flowing through the middle portions slows down in speed due to reduced spacing between the adjacent middle portions, thereby preventing the occurrence of resin flash. In contrast, the outer lead pins of Mizue, notwithstanding their protruded design, are exposed to outside of the encapsulating resin.

Even if Mizue were somehow combined with Kitaoka, it would not be possible to produce the Applicants' claimed invention, for at least the reasons discussed above. Even if the outer lead pins 10 of Mizue were somehow incorporated into Kitaoka, the protrusions thereof are exposed outside the encapsulant, and are **not** capable of preventing resin flash.

It is believed the application is in condition for immediate allowance, which action is earnestly solicited.

Respectfully submitted,



Peter F. Corless (Reg. No. 33,860)
Steven M. Jensen (Reg. No. 42,693)
Dike Bronstein, Roberts & Cushman
Intellectual Property Practice Group
EDWARDS & ANGELL, LLP
P.O. Box 9169
Boston, MA 02209

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Phone: (617) 439-4444

Customer No. 21874